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April 20, 1964  
MW-M-776

Dear Joe:

Enclosed are three copies of the 10th Progress Report for the period covering 10 March to 9 April 1964.

Regards,

Charlie

<sup>MM</sup>  
Enclosures (3)

OXC - 6826  
COPY 2 OF 2COHERENT LIGHT ENLARGERSPO 26040

10th Progress Report

10 March to 9 April 1964

This project has now reached a phase in which almost all effort is concentrated on production of the instrument and its auxiliary equipment. All components from vendors have been arriving substantially on schedule and have been assembled into their subassemblies with only minor difficulties, if any. Electrical design and drafting has progressed very rapidly as has assembly of electrical components. Our optical engineer is currently preparing final alignment and test procedures.

ITEMS OF INTEREST:

The vertical liquid gate was assembled and was found to operate very well. The liquid rises evenly from the manifolds at the bottom, expelling the air through the top vent. Both sides of the film are completely wetted and no bubbles are present. Freon 113 was used for the test because of its ease of handling, but it is not anticipated that other liquids will differ in performance.

A trial assembly of the optics was made to determine (a) final element spacing; (b) the need for coating; and (c) to evaluate the need for a diffuser in the prototype.

(a) In general, the elements fit the cells with minimum clearances so that no centering shims will be required. Spacers were machined to final dimensions from measurements taken at the trial assembly.

(b) The coating requirements for curved surfaces were found to be not critical and magnesium-fluoride will be used on these. Flat surfaces, however, were found to cause quite harmful images, and these will be coated so that the reflectance will not exceed 0.2%. Coating is scheduled for completion by 17 April 1964.

(c) The need for a diffuser was, unfortunately, firmly established. Full coherence of the laser so effectively magnified the effects of the most minute defects that a clear image plane (uniform illumination) seems unobtainable. However, only a small departure from full coherence, 5%, resulted in elimination of all important image plane defects. By careful choice of diffuser, it is, therefore, possible to obtain the high modulation transfer function desired. The auxiliary

source will permit the Customer to determine the effects of various degrees of coherence on his enlarging technique.

During the coming month, the instrument will continue to be assembled and should be brought close to completion. The Technical Writing Group is now writing the operating manual which will accompany the instrument upon delivery.

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